Eos, Transactions, American Geophysical Union

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Starra de la Stile. In Colhumbus, a composite, resergent caldera, 35 Na sist at It Salto. Tempets to derer
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Chibushua have been described from the Toeochic and
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ico follow the Valles-type Fewirgent on idera model,
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J. Geophyer Esse, S. Papar 480307

CALERAS AND AST-YIGH TUFFS OF THE NOGOLLOW MUSTAINS, NEW HERICO

1. C. Ratre' (U.S. Geological Survey, Box 25046, Federal Center, MS 905, Denver, Colorado 80225), B. F. Marvin, C. W. Messer, M. Bilatusan

The Mogollom Mountains are a pajor volcanic mource area in the southwestern part of the Mogollom-Bettl volcanic rocks are exposed. The volcanic sequence includes eight major (1000 ms) and dide-Tertisty volcanic rocks are exposed. The volcanic sequence includes eight major (1000 ms) ash-flow toff units, which are believed to represent a mandaton-related, compositionally-mand sch-flow tuff pairs. The cyclical cruption, beginning about M Hs. of these stellar, compositionally sende tuffs from esperate, shallow magna Chabers suggests derives ion from a common parent magna source. Major sub-flowed 26-23 Ms by fundamentally begained wave followed 26-23 Ms by fundamentally begained volcanies characterized mainly by andeastic copylitons. About 27-21 Ms. high-silica thypites, tholeitic baselt and alkalt haselt were evopted as a bimodal suite roughly coincident with the beginning of Sasia and Range extensional faulting. Alkalt cityins basait flows as young as 5.5 Ms are interlayered with besin-fill Conglomerate adjacent to the Mogollom Mountaine. (Calderse, major) J. Geophys. Res., S. Paper 480191

Dog tuffs. Res., 5, Paper 450191 8699 VOICABOLOGY CALGERAS OF THE SIERRA MADRE OCCIDENTAL VOLCANIC FIELD CALCERAS OF THE SIERRA MADRE OCCIDENTAL VOLCAMIC FIELD MESIERN MEXICO Erid R. Svanson (Division of Earth and Physical Sciences, University of Texas at San Antonio, San Antonio, Texas, 12825), Fred K. Rollowship, Approximately 296,000 km² of vastern Nexico is covered by a volcanic sequence that has an average thickness of 1 km and is mostly ask-flow tuff, Although some 350 calderes are suggested by this trespondent volume, only a few have han letter and the second sequences.

Vol. 65, No. 10, Pages 81-96

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SEA HEIGHT VARIABILITY (cm)

SEASAT ALTIMETER DATA

Transactions, American Geophysical Union

Vol. 65 No. 10 March 6, 1984

March 6, 16

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Yews

### Ocean Drilling Ship Chosen

The SedeolBP 471, owned jointly by Sedco, Inc., of Dallas, Tex., and British Petroleum. has been selected as the drill ship for the Ocean Drilling Program (ODP). The contract, with a specified initial term of 4 years with 10 1-year options after that, is expected to be signed by mid March by Texas A&M University, the ODP science operator, and Sedco, Inc. Texas A&M will develop the design for scientific and laboratory spaces aboard the SedcolBP 471 and will oversee the ship conversion. Testing and shakedown of the ship is scheduled for the coming autumn; the first scientific cruise is scheduled for next January One year ago, the commercial drilling mar-

ket sagged, opening up the option for leasing a commercial drill ship (Eas, February 22, 1983, p. 73). Previously, the ship of choice had been the Glomar Explorer; rehabilitating the former CIA salvage ship would have been extremely expensive, however.

Built in Halifax, Nova Scotia, in 1978, the Sedco/BP ship will provide berths for a crew of 55 and for a scientific crew of 50. By comparison, the Glowar Challenger could accommodate only 45 crew members and 29 scientists (see Table 1). Moreover, the new drill ship will provide roughly 2.5 times the laboratory space that the Challenger had afforded scientists. Although the new drill ship has the capacity for deploying a riser system (with blow-out prevention) in 1,800 m of water, the capability is not expected to be used during the first few years of operation. The Sedco BP ship has better weather limits than the Challenger, Philip Rabinowitz, ODP project director and principal scientist, told Eos.

Current plans call for early legs of the drilling program to include studies of the tectonics of the eastern Gulf of Mexico; the carbonate sedimentation in the Balannas: 3 study of the opening of the Labrador Sea and its history of glaciation; early rifting processes in the Norwegian Sea: chronology of sediments and the distribution of Sahara dust off northwest Africa; the development of back-are basins; tectonics of the Hellenic are and the Tyrthenian Sea; and paleoenvironmental studies of the ancient Tethyan Sea. Each leg will last approximately 2 months.

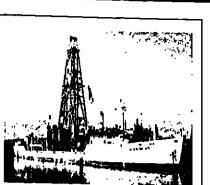
ODP will incorporate a new drilling capability, bare-rock spud-in, that will allow scientists to study active processes of crustal accre-tion in areas of little or no sediment accumu-

The network overseeing ODP involves many: ODP is supported by the National Science Foundation through its Division of Ocean Sciences. The Joint Oceanographic Institutions, Inc. (JOI), a consortium of 10 major oceanographic institutions, is ODP program manager. Scientific direction is provided by the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES), an international organization of earth scientists from nations participating in ODP. Drill ship operations will be managed from ODP science operator headquarters at Texas A&M University, where cores from the Pacific and Indian oceans will be kept. (Construction of a new \$5 million building at Texas A&M, to house the core repository and the drilling offices, is expected to begin later this year and to be

TABLE 1. Drilling Ship Characteristics

<del></del>		
Characteristic	Challenger	SedcolBP 471
Length	122 m	143 m
Beam	20 m	21 m
Operating draft	6.7 m	7.6 m
Operating dis-	9600	16,900
placement	metric	metric
	tons	Lons
Speed (ілахі-	22 km/	26 km/
mum)	hour	hour
Crew capacity	45	55
acientific crew	29	50
capacity		
Quarters	74	116
Drill string	7000 m	9100 m
capacity		
Heave compen-	poor re-	good
sation	trofit	•
Mud/cement	limited	good
systems		٠.
Casing storage	limited	good
riser and	none	ī800 m
blowout		capacity
prevention		
Sea keeping	fair	good
capacity	•	1
High latitude	good	good
capability Laboratory		
space	426 m²	1115 m²
Installed power		la la mana di sas
and hower	77.00 kW	14.700 kW

good as any, according to Melvin Peterson, step in the formation of planets. DSDP program manager.



The SedcolBP 471; selected as the new drill ship for the Ocean Drilling Program is expected to be ready for its first scientific cruise in January 1985.

completed 2 years later.) Lamont-Doherty Geological Observatory of Columbia University will be a repository for cores from the Atlantic and Amarctic oceans and from the Mediterranean and Caribbean seas. Lamont-Doherty also will plan for and manage wire-

line logging operations.

In addition to U.S. support, several nations have either joined as full participants or as candidate members. A memorandum of understanding for participation as a full member in ODP was signed in ceremonies on March 5 by the Federal Republic of Germany. The FRG is the first country to join ODP as a regular member. The European Science Foundation (ESF), a consortium that includes Italy, the Netherlands, Sweden, and Switzerland, signed on as a candidate member at the same ceremony last week. ESF joins Canada and the United Kingdom as candidate members; each will participate in the planning of drilling activities.

William J. Merrell, Jr., associate dean of the College of Geosciences at Texas A&M, is ODP principal investigator -- BTR

### Arctic Hurricanes

The devastating winter storms that swoop across the Arctic, endangering offshore oil rigs, shipping, and fishing operations in their paths, are the subject of current study by a team of weather researchers from the National Oceanic and Atmospheric Administration (NOAA) As part of the study, U.S. scientists and those from several other countries also will attempt to estimate how much carbon dioxide is transferred from the atmosphere into the North Adamic's deep waters during winter storms.

A typical polar low, like a hurricane, has a spiral cloud pattern and winds exceeding 120 km per hour, said Melvyn Shapiro, senior meteorologist on the polar-low study. The storms are smaller than most hurricanes. however, and rarely have a diameter greater than 320 km. Some, but not all, develop an "eye," like a hurricane. Polar lows, only recently documented from polar orbiting satellite imagery, appear to form primarily from October to April, but peak in February.

"These arctic hurricanes can develop very rapidly," Shapiro said. In a matter of hours the hurricanes can produce winds as high as 160 km per hour, causing "very high sea states that are extremely dangerous to shipping in the area, as well as to any offshore oil

activities," he added. The CO2 investigation may give scientists additional information on possible global warming from increased CO2; the ocean is believed to be a sink for nearly half of the CO2 injected into the atmosphere by the burning of fossil fuels. However, little is known about the uptake of CO2 in regions of the North Atlantic, according to NOAA's

Richard Gammon Researchers also will study Icelandic lows. which play a major role in extracting heat from the Gulf Stream. In addition, the scientists will examine electrical properties, conduct surface profiling of the Greenland ice cap, perform meteorological and oceanographic studies along the polar ice edge to investigate the ice edge's possible link to the outbreak of cold air masses.

### New Solar Systems?

A team of astronomers from UCLA, Cornell University, and the University of Hawaii have discovered what may be two new planetary systems aborning around young stars in the constellations Taurus and Monoceros. The team's ground-based infrared observa-tions of HL Tau and R Mon reveal features similar to those seen around Vega and Fo-Source: Program manager for the Deep Sea nomical Satellite (1RAS)—disks of very fine Drilling Project and project director for the dust particles extending outward from a cen-Ocean Drilling Program.

Use of the dust particles extending outward from a cen-tral star. If current theories about solar sys-With new equipment, the heave compensation on the Glowar Challenger could be as most likely represent an early evolutionary.

Using the technique of speckle interferom-

etry to counter the effects of atmospheric dis-tortion, Steven Beckwith of Cornell, Benjamin Zuckerman of UCLA, Melvin Dyck of the University of Hawaii, and Cornell guadu ate student Michael Skrutskie were able to make the observations using telescopes on Mauna Kea in Hawaii and Kitt Peak in Atizona. What they saw in both cases was shortwavelength infrared starlight being scattered by dust particles surrounding the star. In the case of HL Tau, the dusty "cloud" appears to extend out about 160 Astronomical Units from the star (4 times as wide as our solar system) in the east-west direction, but only half that far in the north-south direction. The explanation, according to Beckwith, is that "we're looking at a tilted disk rather than an oblate spheroid." The cloud, in other words, is neither exactly edge-on nor face-on as seen from earth.

The disk surrounding R Mon is 4 times larger than the one around HL Tau, but is otherwise similar. Both are most likely composed of silicate dust, with the individual particles only a few thousandths of a millimeter across. Both stars are also very young-amere 100,000 years old in the case of 111. Tau, much younger than either Vega or Fo-

These observations, when plugged into theories of planetary formation, suggest that the swarms of material surrounding HI. Fau and R Mon have not yet coalesced into the planetesimals that eventually become planets. Soyoung is the III. Tau system, in fact, that radiation pressure from the star would only just have begun to sweep these small dust particles away from the center of the disk. From their observations, the astronomers also infer the presence of hydrogen and helium gas around the two stars, comparable in total mass to that of our own giant gas planets. And even though the total amount of dust directly observed by the team only adds up to one earth mass in the case of HI. Tait and live earth masses for R Mon. Beckwith believes that this is a conservative estimate of the total amount of material in the systems, because "we're probably only seeing the edge

of the shell." All of this adds up to the newest rentance entries in what may eventually become a caralog of other solar systems in the galaxy in dif-Terent stages of evolution from our own. $\rightarrow TR$ 

### Changes in Earth **Programs at NSF**

Three programs within the Earth Sciences Division of the National Science Foundation (NSF) have changed names to more accurately reflect the programs supported by them, according to James F. Hays, division director. In addition, the division has two new programs: continental lithosphere and instrumentation and facilities.

The seismology and deep earth structure program is now the seismology program; the vironmental geosciences program will now be called the surficial processes program. The scope of these two programs has not been

Volcanology and mantle geochemistry, for-menly the mantle geochemistry program, has been expanded to include all aspects of volcanological research. Previously, volcanology proposals were considered in various programs within the division.

The continental lithosphere program, proposed as a separate program in the fiscal 1985 budget (£os, February 14, 1984, p. 49), will support multidisciplinary, multi-ins tional research projects, including COCORP (Consortium for Continental Reflection Profiling), a global digital seismic array, seismic studies of continental crust, and continental drilling. Within the earth sciences community there is a growing interest in developing such larger cooperative programs, Hays told East Recent reports by the National Research Council's Board on Earth Sciences and by the earth sciences briefing panel within the National Academy of Sciences' Committee on Science, Engineering, and Public Policy confirm this consensus (Eas. December 20, 1983, p. 985), Havs added.

The establishment of a new program called instrumentation and facilities formulizes etforts in the past 2 years to direct more funding to instrumentation, Hays said. The program will support development of new and proved instruments and the purchase of equipment such as electron microscopes, magnetometers, X ray diffractometers, computers, and mass spectrometers.

Annual target dates for proposal submissions are announced in the NSF Bulletin. Compliance with the target dates may reduce the interval between submission to NSF and the making of funding decisions. However, proposals will be accepted at any time. Instructions for preparation of proposuls are included in "Grants for Scientific and Engineering Research" (NSF 83-57). Project descriptions should not exceed 15 single-spaced typewritten pages (the equivalent of 30 done. ble-spaced pages is acceptable). -BTR

### **Young Faculty** Awards

Of the 200 science and engineering faculty members who have been selected to receive the first Presidential Young Investigator Awards, roughly one dozen are researchers in geophysics or geophysics-related fields. The awards, which are for up to \$100,000 per year for 5 years (a combination of federal and matching private funds) for each recipi-ent, are intended to help universities attract and retain outstanding young Ph.D.'s who might otherwise pursue careers outside aca-

More than half of the 200 awards for fiscal 1985 went to engineers. The selection of the 200 was made from 1549 nominations from 232 Ph.D.-granting institutions. The new investigators will conduct research at 74 universities in 35 states. The program is administered by the National Science Foundation

President Reagan has proposed that 400 awards be given in fiscal 1985; 200 to cominue support for those just selected and 200 to

support a new group of recipients.
The annual base grant from NSF is \$25,000. In addition, NSF will provide up to \$37,000 per year to match contributions from industrial sources. Individual universities are responsible for raising the nonfederal funds.

Among the award recipients are Robert W. Clayton, California Institute of Technology; global seismology.

A. Gordon Emslie, University of Alabama Humsville: solar astronomy.

Michael H. Engel, University of Oklahoma Norman; organic geochemistry. Raymond Jeandoz, University of California,

Berkeley; high pressure geophysics. Joseph L. Kirschvink, California Institute of Technology; paleomagnetism and geobjo-

Roman Krzysztolowicz, University of Virginia, water resources engineering.

Daniel R. Lynch, Dartmouth College, water resources engineering.
Larry J. Rull, University of Michigan, Ann

Athor: earthquake seismology. Jery R. Stedinger, Cornell University; by

drology and water resources. Duane E. Stevens, Colorado State Universi ty: dynamics of earth's atmosphere.

E. Bruce Watson, Rensscher Polytechnic Institute: experimental geothernstry.—BTR

## Geophysicists

Hugh Odishaw, 67, died on March 4. An AGU Fellow, he joined AGU in 1954 as a member of the Solar-Planetary Relationships section. The former executive director of the U.S. National Committee for the International Geophysical Year was a professor of geophysics at the University of Arizona in Tuc-

### Recent Ph.D.'s

Ess periodically lists information on recenily accepted doctoral dissertations in the disciplines of geophysics. Faculty members are invited to submit the following information, on institution letterhead, also the signature of the faculty advisor or depment chairman:

thathe dissertation alde

(2) author's name. (3) name of the degree-granting department and (-l) faculty advisor,

(5) month and year degree was awarded If possible include the current address and telephone number of the degree recipient (this infor-

mation will not be published). sectations wi the others listed, are available from University Microlilus International, Dissertation Copies, P.O. Box 1764, Ann Arbor, MI 48106,

Effect of Subsoil Structure on the Movement of Two Non-Volatile Organic Pollulants (Nitrobenzene, Trichlorobenzene), Lawrence J. Henderson, Oklahoma State Univ., 1983 (GAN83-25816). Evaluation of Energency Water Supplies as Drought Management Alternatives, Benedykt Dzieglelewski, Southern Illinois Univ., Carbon-

dale, 1983 (GAX89-26527). Flow Strengths of Quartz Aggregates, Cashun and Oxygen Diffusion in Calcite, Andreas K. Kronenberg, Brown Unly., 1983 (GAN83-25997).

Geochemical Evolution of the Inversely Zoned Notch Peak Granitic Stock, Utak, Peter 1, Nube lek, State Univ. of New York, Stony Brook, 1983 (GAX#3-25928). Geochemistry of Orca Basin Sediments, Der-Duen

Sheu, Texas A&M Univ., 1983 (GAX83-23716). Groundwater Flow in the Crystalline Rocks of the Acrea Plains of Ghann, West Africa, Korina Atobrah, Princeton Univ., 1983 (GAX83-23878). Inversion of Body-Wave Seismographs for Upper Manile Structure, Jeffrey W. Given, California

News (cont. on p. 98)

High-Grade Metamorphic Carbonates - A New Approach to Time in Metamorphism, Thomas D. Coskren, Univ. of Rentucky, 1983 GGA X83-99608)

Metamorphism and Copper Mineralization of the Portage Lake Lava Series, Northern Michigan, Alexander Livnat, Univ. of Michigan, 1983 (GAX83-24232).

Microgravimetry and the Theory, Measurement and Application of Gravity Gradients, Dwain K. Buder, Texas A&M Univ., 1983 (GAX83-2365 f).

Paleomagnetic Studies in the Northern Appalachians and Their Implications for the Paleozoic History of the Orogen, Dann J. Spariosu, Dept. of Geological Sciences, Columbia Univ., November 1983.

Petrology and Geochemistry of Okmok and Wran-gell Volomosy, Alaska, John Christopher, Univ. of California, Santa Cruz, 1983 (GAX83-23785).

Photoredox Properties of Iron in Natural Waters,

T. David Waite, Dept. of Civil Engineering. MIT, [February 1984].

ological Model to Predict Texas Rich Yields, Vira Phonosombat, Texas A&M Univ., 1983 (GAX83-23702). Relationships of Rock Cleavage Fabrics to Incre-

mental and Accumulated Strain in a Portion of

the Blue Ridge, Viginia, James B. Tapp, Univ. of Oklahoma, 1983 (GAX83-24895). Response of a Small Lake to Atmospheric Forcing During Fall Gooling, Paul T. Strub, Univ. of

California, Davis, 1983 (GAX83-26108). Risk Assessment for Water Quality Management. Heather D. Wicke, Univ. of Michigan, 1983 (GAX83-24309).

Statistical-Dynamical Study of the Large-Scale Intrascasonal Variability of the Northern Hemi-sphere Winter Girculation, Siegtried D. Schu-hert, Univ. of Wisconsin-Madison, 1983 (GAX83-

Structural and Geochemical Evolution of a Mineralized Volcanic Vent at Cerro De Pasco, Peru, Ralph D. Rogers, Univ. of Arizona, 1983 (GAX83-23747).

Structuse of Turbulent Entraining Flow in an Annulus With a Rotating Screen, Soon-Chang Yoon, Oregon State Univ., 1983 (GAN83-

Studies on the Generation, Dispersal and Deposition of Tephra in the Marine and Terrestrial

Environment, Steven N. Carey, Univ. of Rhode Forum Island, 1983 (GAX83-26472). Theoretical and Empirical Terrestrial Heat Flow

Studies (Mexico), John P. Ziagos, Southern

Methodist Univ., 1983 (GAX83-20672). Theoretical Studies of Mesoscale Eddies and Their Fall Meeting Site Influence on Acoustic Transmission Through the Ocean, Samuel Itzikowitz, Reusselaer Polytechnic Institute, 1983 (GAX83-21195). Thermal Tides in the Atompsphere of Venus, Ju-dith B. Pechmann, California Institute of Technology, 1983 (GAX83-21031).

Thorium-230~Uranum-238 Disequilbrium Systematics in Young Volcante Rocks (Hawaii, California, Price Edward Island), Sally Newman, Univ. of California, San Diego, 1983 (GAX83-19134).

Three Dimensional Ray-Tracing and Ray-Inversion in Layered Media (1), Inverse Scattering and Curved Ray Tomography With Applications to Seismology (2), John A. Fawcen, California Institute of Technology, 1983 (GAX83-25731).

Vacuum Ultraviolet Photogragmentation of Water and Nitrogen Dioxide: Laboratory Studies and Atmospheric Applications, Jan-Bai Nec, Univ. of Michigan, 1983 (GAX83-24253).

Wave Propagation in Purous Rock and Models for Crustal Structure, Terry D. Jones, Stanford Univ., 1983 (GAX83-20729).

# Books

### Mineral Deposits and Global Tectonic Settings

A. H. G. Mitchell and M. S. Garson, Academic, New York, xvii + 405 pp., 1981, \$48.50.

Reviewed by Robin Brett

"The earth does not conceal metals in her depths because she does not wish that men should dig them out, but because provolent and sagarious Nature has appointed for each thing its place" Agricola (De Re Metallica, 1556, translated by H. C. Hoover and L. H. Hoover, London, Mining

This book aims to show how ore deposits are related to the concept of plate tectonics; it succeeds. Not too long ago, opaque minerals in a thin section were called "ore" by petrologists and then ignored, and ore deposits were freaks of nature which tended to be where you found them. Today, "ore" and ore deposits have become part of mainstream geologic studies—opaque minerals can reveal much about the evolution of a rock, and mineral deposits can reveal tectonic settings.

The main value of this book to most AGU members is that it shows how ore deposits can reveal tectonic setting, ambiguously in many cases, to be sure, but a pattern is emerging. Mitchell and Garson do not stress the flip side, the application of plate tectonics to exploration, although applications are ap-parent, and a short chapter is devoted to this

The authors emphasize that ores are rocks that are part of a stratigraphic or igneous sequence and that, just as andesites are anticipated in some tectonic settings and not in others, so are certain types of ore deposits. Mitchell and Garson, whose publications indi-cate that they are equally at home in the areas of tectonics and mineral deposits, discuss the plan of the book in their preface:

In the first chapter we discuss briefly why tectonic settings are a major control on the nature of the ininerals deposited in economic concentrations, and review the pre-plate concepts of the relationship of mineralization to geosynclinal settings. We then introduce the plate tectonic hypothesis, and indicate the major developments in ideas on the relationship of mineral deposition to plate processes. The next six chap-ters, comprising the bulk of the book, are

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concerned with the brief description of each of the major types of tectonic settings recognizable today followed by an account of the main kinds of economic deposit fround in modern settings and inferred ancient equivalents. We concentrate on aspects of the deposits' genesis related to the regional tectonic setting, and no attempt is made to review features such as temperature of formation or mineralogy which can be found in textbooks concerned exclusively with mineralization and ore hodies.

The authors divide tectonic settings into six categories; each category is in turn further subdivided into seven groups. The six major categories are (1) hot spots, rifts, and autocogens; (2) passive continental margins and interior basins; (3) oceanic settings (ridges, basins, transforms, and hot spots); (4) subduction-related settings; (5) collision-related settings; and (6) transform faults and lineaments in continental crust.

The authors conclude by tracing the evolution of mineral deposits through an orogenic cycle and then devote a five-page chapter to tectonic settings as a guide to exploration. The book has an abundance of figures re-printed from the literature and 36 pages of references (published by 1981) that are invaluable, especially because readers interested in plate tectonics are not generally familiar with the literature of ore deposits.

The authors are both ambitious and courageous in attempting to synthesize knowledge of this subject, and their attempt is an unqualified success. Summaries of examples of eposits in different tectonic settings are left with many unanswered questions that provoked considerable thought—a sign of a good scientific book. Why are certain elements concentrated in certain settings, and why are apparently similar deposits from different settings really similar? Answers to these and other questions will appear in time and will make ore deposits a more powerful tool for

tectonic interpretation. Mitchell and Garson wisely avoid tectonic interpretation of Archean ore deposits. As tectonic interpretation of ore deposits becomes more suphisticated. Archean ore deposits may become a useful took for interpretation of Archean tectonism. Therefore this book is especially recommended to students of the Archean.

The authors have kept an open mind; most interpretations from the literature are presented without question. As a result, many readers will question some of the work summarized in many sections of the book. The authors' philosophy was clearly to offer completeness rather than to present their own favorite interpretations. An example is their reporting a theory for the origin of fluorite deposits in western North America that alleged that the deposits were formed along a more or less continuous system of rifts and lineaments from Mexico to Alaska by fluorine from the lower crust or upper mantle. Other theories are also presented without question, yet the authors do question the widely accept

ed impact origin of Sudbury, Ontario. You may not find your favorite ore deposit mentioned because of space limitations, but Mitchell and Garson dld a fine job with the space available. Southeast Asian deposits receive special attention because of the authors' own experience, so the book has the additional advantage of providing an entry to the lit-crature of these deposits not well known to

Western Hemisphere readers. Traditionally, scientific reviewers comment on typographical errors to prove that they read the book thoroughly. I found none; one reference out of place was the only mistake 1

I recommend this well-written book to stu- Foreword R. A. Price dents of both plate tectonics and ore deposits. Preface R. Van der Voo

example, since it was written, reports have appeared on the Guyamas Basin sulfides and the recent Kuroko study, both with their important tectonic implications. That is not the authors' fault, but rather the sign of a burgeoning field.

Robin Brett is with the U.S. Geological Survey, Reston, VA 22092.

### AGU New Books

AGU, Washington, D.C., viii + 136 pp., 87590-512-9, AGU members \$14, others

The decade of the 1970's saw increasing time, fostered by the Geodynamics Project. Aspects of this project are being continued sphere Program; in particular, Working Group 2 of the program (Phanerozoic plate motions and orogenesis) is active in the unuseful for the determination of continental reconstructions, and this volume presents a

as new results for Paleozoic time. volume represent a state-of-the-art account of Paleozoic paleomagnetic studies as they are being carried out today. In this collection of papers the typical successes and failures of modern paleomagnetic research are represented in accounts of remagnetizations or the lack thereof, as well as some examples where the evidence is not yet clear. All authors have emphasized the geodynamic implications of their results, as well as continental reconstructions based on the latest evidence. Geographically, the papers are representative of the Atlantic-bordering continents, albeit with a heavy emphasis on North American paleo-

This volume is based on selected papers presented in a special symposium cosponsored by Working Group 2 and the American Geophysical Union and held in Philadelphia during the 1982 Spring Meeting of the American Geophysical Union.

Group 2 is starting a decade of international collaboration aimed at enhancing our knowledge about Phanerozoic plate motions, continental configurations, and mountain-building episodes. Future reports are planned on such topics as the structure of the Hercynian and Appalachian mountain belts, the circum-Paorogenic belts and the evolution of the Pacific Ocean, and the evolution of the Mediterranean and the Tethys-bordering continents, each based on symposia organized by the Working Group.

Although it is expensive, undergraduates and researchers alike will benefit from it Already the book is a little out of date. For

Plate Reconstruction From Paleozoic Paleomagnetism

Geodynamics Series, vol. 12, edited by R. Van der Voo, C. R. Scotese, and N. Bonhommet, black-and-white illustrations, 1984, ISBN 0-

global evidence leading to the reconstruction of the continents and oceanic plates through under the auspices of the International Litho raveling of past continental distributions and the plate tectonic products of continental motions. Paleomagnetic techniques are especially number of papers dealing with syntheses and new interpretations of previous results as well

The editors believe that the contents of this

With this first interim report, Working

(From the preface by R. Van der Voo.)

The world is clearly a very noubled place. Many problems contributing to this prouble, such as climatic changes, effects of global war, geophysical disasters, etc., are the concern and come under the pur view of members of AGU. Within this context, it was clear at the last AGU Fall Meeting that the matter appermost in most members minds was the large number of parallel sessions.

In light of the overwhelming importance ascribed to this issue, I have devoted considerable thought as to how to solve this overcrowding. Putting aside for the moment the issue of whether or not the recent Cathedral Hill Hotel fire was a sign from on high in this matter, I wish to pur sue what we, as a Union, can do to solve the problem. Remarkably enough, the Meetings Committee had already apparently perceived the nature of the solution (although dimly) and had stumbled upon a form of my result in a different context. It is perhaps worthwhile for me to review this previous situation prior to presenting my ideas for the West Coast meeting.

The annual Spring Meeting used to have an alarmingly large growth rate, just as the Fall Meeting has now. Everyone seemed to enjoy going to Washington, the meeting typically occupied 5 of the 10 nice days of weather available each year in the Washington area, and the seafood (barring Red Tide) was rather good. Result: The Spring Meeting grew by leaps and bounds, sessions were overcrowded, time allotments for presentations shrank and, eventually, the dreaded parallel session became the order of the day.

At this point the uncanny instincts and cunning intuition that characterize Meetings Committee members' minds came into play. Possibly more by luck than anything else they falteringly concluded that the meeting site should be moved. Andbehold!—the growth rate of the Spring Meeting became manageable. Without there ever being a clear enunciation of their underlying principle, the Committee has moved nonetheless even further toward the ultimate Solution (and further from the East Coast) by holding the next Spring Meeting in Cincinnati.

What does all this mean? What has this o do with the Fall Meeting? Well, of ourse, the above facts suggest a solution which has everything. It is simple, elegant, fraconian. People like San Francisco as a nceting place, so my proposal is: Let us nove the meeting site. For the more timid and take-it-easy among us I might suggest that the Meetings Committee consider what I like to call "Baltimore West," i.e., Bakersfield, (My recommendation of this site has nothing—I repeat, nothing—to do with my name being similar to that of the city's founder.) If the Meetings Committee really wants to bite the bullet on this thing then I suggest that the West Coast Meeting be moved immediately to Barstow or. my favorite, Needles. I can assure you that by following this plan, the problem of parallel sessions will be reduced rapidly to t point of zero measure.

> D. N. Baker Los Alamos National Laboratory Los Alamos, NAI 87545

An Introduction to This Volume: Paleozoi Paleomagnetism and the Assembly of Pangea C. R. Scolese

Paleomagnetic Reevaluation of Pangea Reconstructions R Van der Voo, J. Peinado, and C. R. Scotesc

The Tethys Paradox in Plate Tectonics J.

On the Tectonic Evolution of Mexico: Paleomagnetic Constraints I. Urrutia-Fucugau-

Paleomagnetism of the Middle Mississippia Greenbrier Group in West Virginia, USA D.-S. L. Chen and V. A. Schmidt Paleomagnetic Results From the Carboniferous of Nova Scotia C. R. Scotese, R. Van

der Voo, R. E. Johnson, and P. S. Giles. Late Paleozoic Motions of the Meguma Terrane, Nova Scotia: New Paleomagne Evidence D. J. Spariosu, D. V. Kent, and J. D. Keppie

Paleomagnetism of Lower-Middle Devonian and Upper Proterozoic-Cambrian(?) Rocks From Mejeria (Mauritania, West Africa) D. V. Kent, O. Dia, and J. M. A. Sougy Mid-Ordovician Paleomagnetism and the

Proto-Atlantic Ocean in Ireland E. R. Paleomagnetism of the Cambrian Rocks of the Great Valley of East Central Pennsylvania; Fold Test Constraints on the Age of Magnetization R. J. Stead and K. P. Ko-

Was Laurentia Part of an Eocambrian Super-continent? R. Van der Voo, C. McCabe, and

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POSITIONS AVAILABLE

University of Arizona/Research Associate. Applications are invited for two possible positions as research associate in theoretical plasma astrophysics.

search associate in theoretical plasma astrophysics, solar physics and/or cosmic-ray astrophysics. The successful applicant for the first of the positions will be expected to devote a substantial part of his or her research to problems in solar or interplanetary physics. This position can be filled as early as Spring 1984 and applications should be received by April 30, 1984.

The second position involves research on cosmic rays and their interactions, in the solar wind or elsewhere. This position can be filled in Fall 1984, and applications should be received by July 31, 1984.

Applicants for either position should possess a Ph.D. in a relevant area of physics, astronomy, or planetary sciences.

planetary sciences.
Inquiries and applications should be addressed to Professor E.H. Levy. Department of Planetary Sciences, University of Autona, Tucson, AZ 85721.

na, Iteson, AZ 80721.

Applicants should send a resume, complete bibliography, and arrange for at least three letters of recommendation from persons who are well-acquainted with the applicant's background and potential in parcents.

The University of Arizona is an equal opportuni ty/affirmative action, Tule 1X, Section 504 employ-

or speediest treatment of contributions send three copies of the double-spaced manuscript to one of the editors named below and one copy to

The Weekly Newspaper of Geophysics

Editor-in-Chief: A. F. Spilliaus, Jr., Editors: Marcel Ackerman, Mary P. Anderson, Peter M Bell (News), Bruce Doe, C. Stewart Gillmor History), Clyde C. Goad, Arnold L. Gordon, Louis J. Lanzerotti, Robert A. Phinney; Manag-ing Editor: Gregg Forte; News Writer: Barbara f. Richman: News Assistant: Tony Reichhardt; Production Staff; James M. Hebblethwaite, Dac Sung Kim, Patricia Lichiello, Lisa Lichtenstein, Cynthia T. McManigal.

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American Geophysical Union 2000 Florida Avenue, N.W. Washington, DC 20009

Cover. Suggested continent positions in Eocambrian (Vendian-Tommotian) and Late Carboniferous (Westphalian-Steffanian) depicting the assembly of Pangea by the end of the Paleozoic. Shown are figures 1 and 9 from C. R. Scotese's introduction to Plate Reconstruction From Paleozoic Paleomagnetism, edited by R. Van der Voo, C. R. Scotese, and N. Bonhommet, the latest volume in AGU's Geodynamics Se ries, described on p. 98, and 103.

University of Kentucky. The Department of Geology mytes applications hat two tenure track faculty positions. Areas of specialization are, 1) Geophysics, 2) 8th neutral or Tectural geology with some emphasis on geochemistry, geophysics, geomathematic or petroleum geology. It is anticipated that holy positions will be filled at the level of Assistant Profession but applications for a muce senion actual stellar

suring will be interfact the level of Assistant Professor but applications for a more senior person will be considered. Degree of Ph.D. is required.

The Department awards BS, MS, and PhD degrees. The starting rank and salary depends on qualifications and experience—either industrial or assess.

acaremic.

Letters of application should include a full euronalium return statement of interior regarding research, names of three referees, and should be addressed to: Dr. Nicholas Rast, Charman of Search Committee, Bowman Hall, Room 253, University of Kentucky, Lexington, KY 40506-40536, 4006 237-40222, DEADLINETO: application is APRIL 15, 1984.

The University of Kentucky is an allumative action and equal opportunity institution.

Research Position in Space Plasma and Auroral Physics. Two research positions at the level of assistant or associate research scientists are available in the Department of Physics & Astronomy at the University of lows for qualified candidates with a Ph.D. degree and experience in space plasmas analor au-toral physics. Present research in space plasma physics emphasizes analysis and interpretation of observations of magnetospheric plasmas using in-strumentation on board earth-orbiting spacecraft in the IMP and ISEE Missions. The University of Io-wa's global imaging instrumentation on the spacethe IMP and ISEE Missions. The University of fo-wa's global imaging instrumentation on the space-craft Dynamics Explorer I is the source of an exten-sive data base of auroral images from high abitudes at visible and ultraviolet wavelengths. Photometric observations are also available for other areas of re-search including the physics of the upper atmo-sphere and the global distribution of atmospheric ozone. The applicant should identify and describe areas of his or her expertise which can support ex-perimental or theoretical investigations in space plasma physics and/or auroral physics. Salary and position will be determined by the applicant's quali-lications and experience.

inations and experience.

A resume and the names of three persons knowledgeable of applicant's experience should be forwarded to: L. A. Frank, Department of Physics & Astronomy, University of Iowa, Van Allen Hall, Iowa City, Iowa 52242.

The University of Iowa, the property of Iowa, Van Allen Hall, Iowa City, Iowa 52242. The University of Iowa is an affirmative action/

Ocean Turbulence/Oregon State University. Join us in studying turbulence in equatorial waters! A postdoctoral position is available at Oregon State positios toral position is available at Oregon Sate University in a project emitted "Timbulent Transports in "TROPIC HEAT." The successful applicant will assume a major share of the responsibility for deployment of vertical probling ("microstructure") instruments on the Inst TROPIC HEAT (truise in November 1984 and then will share responsibility for scientific analysis of the data obtained. The starting date is rounifully I August 1984, but we somewhat negotiable. Starting salary is \$20,000 yearly "Applicants must have a Ph.D. in the physical sciences for confineriting and must be caudle of their sciences of engineering and must be capable of per-torning independent research on oceans turbu-lence. Applications must be received by 31 March 1981 by:

Doughs R. Caldwell
College of Oreamigraphy
Oregon State University
Convality OR 97381
Oregon State University is an allimative actions
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Air Force Geophysics Laboratory Geophysics Scholar Program (1984–1985). The Air Force Geophysics Laboratory (AFGL) and The Southeastern Center for Electrical Engineering Education (SCEEE) announce that applications are invited for research appointments during the 1984–1985 year in the Geophysics Scholar Program. This program provides research opportunities of 10 to 12 months duration for selected Engineers and Scientists to perform research in residence at the AFGL, Hanscom AFB, near Boston, Massachuseus. Scholars will be selected primanily from such fields as Geophysics. Atmospheric Physics, Meneorology, Ion Chemistry, Applied Science, Mathematical Modeling using Computers, and Engineering.

To be eligible, candidates must have a Ph.D. or equivalent experience in an appropriate technical field. Some appointments may be confirmed prior to August 1984 so early applications are encouraged. All qualified applicants will receive consideration without regard to race, color, religion, sex, or national origin. Application Deadline for September Appointments: August 1, 1984. For further information and application forms contact: SCEEE, 1101 Massachusetts Avenue, St. Cloud, FL 32769 Teleptone: (305) 892-6146.

SCEEE supports Equal Opportunity/Affirmative Action.

Marine Geology and Geophysics/University of Washington. The School of Oceanography is seeking candidates for a position as Research Assistant Professor, but applications at a more senior level will be considered. Preference will be given to a canwill be considered. Preference will be given to a candidate who has research interests in marine geology and geophysics and who will interact with our ongoing research projects, especially in the area of ridge-crest processes. Although this position will eventually be funded through self-generated research grants, partial financial support is available for the first two years. Teaching requirements will be limited and at the graduate level. For consideration, send a resume, a brief letter describing research interests, and four letters of reference by 1 May 1094 to: May 1984 to:
Professor Brian T.R. Lewis

Director
School of Oceanography, WB-10
University of Washington
Scattle, WA 98195
The University of Washington is an affirmative
action/equal opportunity employer.

University of Rochester/Postdoctoral Position in Low Temperature Geochemistry. The Department of Geological Sciences has a postdoctoral position for research on low-level, naturally occurring radioisotopes (Be-10, Cl-36, 1-129, etc.). The research involves the separation of trace amounts of these elements with emphasis on the measurement of I-129 in a variety of materials to evaluate its potential as a tracer for fluid movements. Measurements will be carried out on the University's random accelerator.

ments will be carried out on the barrets of accelerator.

The position is available immediately and is initially for one year will a possible one year extension. Send applications with resume and addresses of three referees to:

Dr. Udo Fehn

Department of Geological Sciences

University of Rochester

Rochester, NY 1469?

The University of Rochester is an equal opportu-

### **FACULTY POSITION**

Geological Engineering Program Department of Civil and Environmental Engineering

Washington State University

The Geological Engineering Program at Washington State University has a tenure-track faculty position at the assistant/associate professor level in the area(s) of geohydrology and/or borehole geophysics. A Ph.D. is required and the ideal candidate will have a background combining both

Geohydrology: A strong background in the geological sciences and a high level of proficiency in numerical modeling is highly desirable. Geophysical exploration background is also desirable. Geophysics: A strong background in borehole geophysics with interest in geohydrology and evaluation of geotechnical properties of rock is

The successful applicant will teach undergraduate and graduate level courses in geohydrology and/or geophysics and be expected to take over an established research program involving graduate students. Professional registration, or qualifications to obtain such registration, is desirable. Qualified applicants should send a resume, copies of undergraduate and graduate transcripts, and at least three letters of recommendation to Dr. Surinder K. Bhagat, Chairperson, Department of Civil and Environmental Engineering, Washington State University, Pullman, Washington 99164-2910 by April 7, 1984. Washington State University is an equal op-

Staff Opportunity: Geophysical Laboratory/Carne-gie Institution of Washington. Privately-en-dowed, basic-research and educational organization seeks outstanding scientist with broad interest in de-veloping the principles of Element Concentration. Applicant's background especially should include experimental experience involving a wide range of pressures and temperatures, theory of mass and

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experimental experience involving a wide range of pressures and temperatures, theory of mass and heat transport, and held aspects of ore deposits. Familiarity with stable-isotope research desirable. Creative and innovative qualities essential.

Successful applicant will be appointed Earth Sciences Research Scholar tor a period not to exceed three years. After demonstration of leadership and excellence in research, the Scholar will be eligible for a regular staff position. Modest funds are available for rechnical support of the Scholar's work.

Applications now being accepted by the Director. Geophysical Laborators, 2801 Upton Street, N.W., Washington, D.C. 2000s, Submit 3–5 page summary of proposed research program, curriculum what three letters of recommendation from pwesons chosen by applicant, and completed Application Form obtainable from the vecture Secretary. Starting date is after 1 July 1984 and is negotiable.

The Carnegie Institution of Washington is an equal opportunity and Altributive action employer.

Faculty Position in Meteorology. Applications are insited for a tenure-track or tenured faculty position in the Division of Meteorology and Physical Oceanography in the Rosensiel School of Marine and Amospheric Science of the University of Meanif. The rank and salary will be negotiated depend-

ing upon qualifications. The applicant must hold a Ph.D. in atmospheric science, or closely related held, and have a thorough knowledge of large-scale atmospheric dynamics. We are especially seeking applications from rhose interested in climate dynamics, including observational studies of all aspects of the general circulation and its interangual variability, although qualified cardidates in other areas are also encouraged to apply. The successful candidate will be free to pursue an active research program with a limited amount of graduate-level teaching. Applicants should submit curriculum vitae and the names of three references to: Dr. Eric J. Pitcher, Chairman of Search Committee, Rosenstiel School of Marine and Atmospheric Science, University of Mianai, 4600 Rickenbacker Causeway, Mann, Florida.

The University of Mianu is a private, independent, international university and is an Equal Opportunity/Allumative Action Employer.

Senior Applications Chemist. Keves Corporation is seeking an individual with a strong Andero al Chemisty background, in particular in Neray Phrotescence, for Applications Laboratory. Three years of experience in Laboratory. Three years of experience in Laboratory. The events of experience in Laboratory and variety of experience of Engineering Advanced degree in Physical Source or Engineering is preferred. Position requires Applications support to Marketing, Sales and R&D operations. Softmir resume to: Mr. Drew Isaaw, Keves Corporation. 1101 Chess Drive, Foster City, CA 94404. ECE MCGPV.

# SENIOR SCIENTISTS ATMOSPHERIC SCIENCE METEOROLOGIST

NASA-Goddard Space Flight Center Laboratory for Atmospheric Sciences Greenbelt, Maryland 20771

NASA/Goddard Space Flight Center, Laboratory for Atmospheric Sciences is now accepting applications for two senior scientist positions to lead scientific research in global weather and climate modeling, predictability studies and related research in the Global Modeling and Simulation Branch. Development and maintenance of collaborative activities with the academic community and other institutions/agencies are also important.

The research program strongly emphasizes use of remotely sensed data in numerical weather prediction, and cooperative efforts with other branches of the Laboratory engaged in atmospheric and climate research. The objectives of research in this branch are to investigate the dynamics of global scale processes including climate and boundary processes on various space and time scales. Activities include theoretical and descriptive studies, modeling and prediction of the atmosphere, data set preparation, future observing system simulation studies, algorithm development and research aimed toward design of new or improved satellite missions. The Branch also has responsibility for leading an "Experimental Climate Forecast Center" recently established under an arrangement with the National Climate Program Office. Providing leadership for this new activity would be a part of the role of one of these two senior positions. There is at present a staff of ten research personnel headed by Dr. Eugenia Kalnay, in addition to a substantial support staff.

These positions will be at the GS-14-15 level with a salary range between \$42,722 and \$65,327, the present salary ceiling.

Interested applicants should send resumes no later than May 30, 1984 to:

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Dr. D. Atlas, Chief Laboratory for Atmospheric Sciences NASA/Goddard Space Flight Center Greenbelt, MD 20771.

The U.S. Geological Survey (USGS), Geologic Division, Office of Earthquakes Volcanoes, and Engineering (OEVE) announces a vacancy for Deputy for External Research to act as a senior staff member and consultant to the Chief, OEVE, in planning of contract and grants programs relating to earthquake hazards reduction research. Duties include managing, reviewing, and coordinating contracts and grants in earthquake research undertaken by OEVE, and maintaining contact with both public and private institutions and agencies conducting related research. Geographic location of this position (Reston, Virginia; Denver. Colorado; Menio Park, California) is subject to negotiation, depending upon selectee's preference and the requirements of management. Position is a GM-15 with initial salary of \$50,252 per annum for new Federal employees. Send Standard form 171 (SF-171), Personal Qualifications Statement, available at any Federal Personnel Office, to:

> Geological Survey ATTN: Mr. R. W. Mervine 215 National Center Reston, Virginia 22092

A detailed resume of education, experience, and salary history may be substituted if an SF-171 is not available. All applicants must submit copies of college transcripts or a list of courses taken. Applications must be received in the USGS Personnel Office by April 13, 1984.

Equal Opportunity Employer.

Staff Poskton/Department of Terrestrial Magne-tism. The Department of Terrestrial Magnetism of the Carnegie Institution of Washington hivins applications for a staff position in good hemistry. Ap-plicates should have a demonstrated ability for ar-tive and innovative independent research using nate e-element and/or isotopic techniques to investi-gate the origin and genchemical evolution of the add earth.

Applicants should send a resume and have three letters of reference forwarded by May 15 to:

Geochemists Sading Continuitee
Department of Terrestrial Magnetism
5244 Broad Branch Road, X.W.
Washington, D.C. 20015
Starting time for the appointment is flexible though a target date of late 1984 is preferred.
Can negle Institution of Washington is an equal conformation, allowables accompanies. opportuids, allomanse action eniployer.

Faculty Position/University of Montana. The Ge-ology Department of the Finyersity of Montana is inviting applications to lift a temporary, one-year position at the Assistant Professor feed (contact pemorning applications to fill a reinjourary, one-year position at the Assistant Professor level (contract period will be from mid-Seprember 1984 to carly June 1995). This position involves replacement of a faculty member on subbatical leave, Ph.D. in geology is preferred, however, M.A.Y with teaching or professorial experience will be considered. Students planning to complete their Doctorate during the 1984—85 academic year are encouraged to apply Teaching responsibilities include undergraduate courses and introductors geology, mineralogy, periology and interest.

Those interested should send a letter of applica-tion, resume, three letters of recommendation to: Arnold J. Silverman, Charman, Department of Go-ology, University of Montana, Mesonda, MT 59812. The DEADLINE for applications is May 15, 1984. The University of Montana is an affirmative ac-limational consection, combana. tion/equal opportunity employer.

**POSTDOCTORAL** APPOINTMENT IN ANALYTICAL SEPARATION OR RADIOCHEMISTRY

The Isotope Geochemistry group of the Los Alamos National Laboratory is seeking candidates for a postdoctoral appointment in unalytical, separation or radio-

This opportunity will include participation in a solar neutrino experiment [Science 216, 51 (1982)] with involvement in separation and purification of trace quantities of technetium from large quantities of mulybdenite. Experience in wet chemical separation is required.

The Laboratory, one of the nation's foremost scientific research organizations, is operated by the University of California for the U.S. Department of Energy. Our New Mexico offers an uncrowded lifestyle with ample recreational activities. Our postdoctoral appointments are for one year, renewable for a second year and pay a stipend amount of \$26,200 to \$27,600 per annum. We provide employee benefits, including incoming that el and moving expenses. Candidates no more than three years past their Ph.D. are invited to apply. U.S. Citizenship is re-

Send your resume in confidence to: Mudeline Lucas DIV 84-AT Personnel Services Division Los Alamos National Luborutor Los Alamos, New Mexico 87545



Coastal Dynamicist at Stony Brook. Position with tenure at advanced Associate Professor or beginning toll Professor level to be available mid-january 1985, for a physical oceanographer specializing in castal ocean dynamics, with a strong interest in analytical and momerical modeling. Must have demonstrated ability in arract research support. Position ratries full support for the avademic year. Candidates should send resume and the names of three individuals from whom letters of reference may be obtained, to Dr. Donald W. Pritchard, Associate Director for Research, Marine Sciences Research Center, SUNY Stony Brook, Stony Brook, NY 11794. Deadline for applications is May 1, 1984.

SUNY Stony Brook is an equal opportunity/aftirmative action employer. AK# 47–81B.

The University of Texas at Dallas/Postdoctoral Openings. The University of Texas at Dallas oc-tasionally has postdoctoral openings in the Physics Program, Current research areas include: NUV La-Program, Gurrent research areas include: XCV Tas-sers and Laser Spectroscopy (C. B. Collins and C. D. Cantrelli, Space Plasma Physics (W. B. Hanson and W. J. Heikkilai, Space Optics (B. A. Finsley), Clus-ter for Studies (A. J. Canningham), Solid State Physics (R. Ghoser and R. Chaney). Supends are competitive Interested applicants should send vita limitation of sex and ethnicity for Allemative Ac-lian Visited Sex and ethnicity for Allemative Action Statistical purposes is represted but not re-quired), and names of three references to: Physics Department, UT-Dallas, P.O. Box 830688, Richard-son, T.X 75083-0688,

UT-Dallas is an Affirmative Action/Equal Oppor-

Howard University/Graduate Faculty Position. Howard University/Graduate Faculty Position.
The Department of Geology/Georgiaphy invites applications for a tenutre that position in geochemistry at rank of Graduate Associate Professor beginning August 1984. Position involves development of graduate research program as Master's level. Specialization in environmental geochemistry/geochronology/isotope geology desired. Send letter of application, resume and trames of three references to:
Dr. David Schwartzman, Department of Geology/Geography, Howard University, Washington, DC 20059.

Sedimentologist. The Geology Department at Washington State University amountees an Assistant Professor femure track position for a field oriented clastic sedimentologist, commencing August 16, 1984. Applicants will be expected to:

1. carry on an active research program 2, supervise graduate students at the M.S. and Ph.D. levels.

3. teach undergraduate courses and graduate

3. teach undergraduate courses and graduate courses in their specialty.

The Geology Department at WSU is a young, growing Department housed in a modern building with research facilities including a microprobe, SEM, sedimentology lab, etc. There are currently 12 faculty members, 50 undergrduate majors and 60 graduate students. In addition the Department shares a Geological Engineering program with Civil and Environmental Engineering.

Closing date for application is May 17, 1984. Candidates must have the Ph.D. and should have a resume, transcripts and list of lice referees sent to:

resume, transcripts and list of live referees sent to:
G.D. Webster, Chairman
Department of Geology
Washington State University
Pullman, WA 99164-2812.

Washington State University is an equal opportu-nity/allurmative action employer.

Planetary Geologist/Geophysicist: Jet Propulsion Laboratory, Earth & Space Sciences Division. The Planetary and Cocamography Section anticipates the availability of one or two bulbing, staff scientist re-search positions in the areas of planetary geology and geophysics. The rank of appointment is open but applicanty should be beyond the postductoral level with a demonstrated record of experise and level with a demonstrated record of expertise and acomplishments in independent research and publication. We welcome applicatus with interest in structural geology and geophysics as applied to the study of solid-body planets and natural suchities with emphasis on determining surface properties and processes on planetaxy objects using ground-base and spacetalt remote sensing data and applicable theoretical and experimental techniques. Applicable theoretical and experimental techniques, Applicable theoretical and experimental techniques. Applicable theoretical and experimental techniques, Applicable theoretical and experimental techniques. Applicable theoretical and experimental techniques, Applicable theoretical and experimental should send letter outfillian R. Ward, Manager, Planetohyr and Cacanography Section, Jet Propulsion Laborators, 4800 Oak Grove Drive, Dept. 1.24, Mail Stop 249-104, Resadena, CA 94-109. An equal opportunity employer m/l.

Physicist. The National Oceanic and Atmospheric Administration (NOAA) announces a Physicist. GS-13, vacancy in the Environmental Research Laboratories, Space Environment Laboratory, Supporting Research Division, Bonder, Colorado, Starting salary at GS-13 level is \$36,132; Duties include conductive terrage. salary at GS-13 level 1s \$36,132; Duties include con-ducting research on the physics of the solar corona as related to the emission of matter and radiation which result in disturbances in the near-earth envi-ronment. Demonstrated achievement in basic astro-physical research is required. For further informa-tion and application procedures, please call Mary, Plumley, NOAA Personnel at (303) 497-3102. Ap-plications must be received by March 30, 1984, to be considered.

Faculty Position at Scripps Institution of Oceanog-raphy/Institute of Geophysics and Planetary Phys-ics. Applications are invited for a tenure track faculty position in the broad field of fluid dynamics which includes, for example, oceanography, both theoretical and observational, numerical modeling of fluids, and the dynamics of the carth's core. This appointment as is the case for all other faculty theoretical and observational, fitting the content of thirds, and the dynamics of the earth's core. This appointment, as is the case for all other faculty positors at IGPP, will be made jointly with the teaching department of Scripps or another department at the University of California, San Diego. Qualifications include a Ph.D. in one of the sciences (including engineering), demonstrated competence in original research (presumably through publication in refereed journals), and in teaching at both the undergraduate and graduate level, which includes an appropriate command of both spoken and written English. Qualified applicants at all levels will be considered. Salary will be considered by the salary will be considered. Salary will be considered as a salary will be considered. Salary will be considered by the salary will be considered by the salary will be considered by the salary will be considered. Salary will be considered by the sala

qual opportunity employer.

Research scientists/University of Colorado. The Laboratory for Atmospheric and Space Physics at the University of Colorado seeks qualified research scientists in the field of atmospheric physics.

The successful applicant(s) would conduct research with the scientific term at LASP analyzing more than two years of Solar Mesosphere Explorer (SME) data. The extensive data base includes global measurements of uzone, temperature, water vapor, nitrogen clioxide and other parameters of the Earth's Mesophere and Stratosphere. A destorate or its equivalent in a relevant subject is necessary. The person(s) selected must be capable of conducting individual research and working as part of a scientific team. A background in solar, planetary or atmospheric sciences is desirable. Salary commensurate with experience. Applications including a current with experience. Applications including a current professional resume and names of three references protessional resum should be sent to:

hould be sent to:
Dr. R.J. Thomas
Laboratory for Atmospheric & Space Physics
Campus Bos 392
University of Cabrado
Boulder, Colorado 80309.
Applications are being accepted on a continuous

The University of Colorado is an equal opportu-

University of New Mexico/Paleomagnetism. The Department of Geology of The University of New Mexico invites applications for a tenure track full-time position as an Assistant Professor with a specially in paleomagnetism beginning Fall 1984. The successful candidate will be expected to maintain an active research program and teach at the undergradate and graduate level. The Department has sixteen full-time laculty, is located in a spectacular natural setting and has excellent analytical facilities. Applicants should submit a resume, transcripts, and three letters of recommendation to R. Ewing, Department of Geology, Albuquerque, New Mexico 87131. The deadline for applications is April 10, 1984.

The University of New Mexico is an equal opportunity/affirmative action institution.

The Lunar and Planetary Institute announces publication of a new book entitled

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edited by E. A. King, Jr.

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POSITIONS WANTED

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Research Assistantships/University of Maryland, The Meteorology Department of the University of

**AGU Scholars** 

In recognition of the strong support of the America Geophysical Union and its substan-

tial contribution to the American Geological

Institute's (AGI) Minority Participation Pro-

gram, 12 of the 1983-1984 AGI scholarship

participants were designated "AGU Scholars." Because part of this support comes from a matching grant from the National Oceanic

and Atmospheric Administration to increase

the number of minority students studying in

fields related to the development of marine

and coastal resources, five of these students

The AGU Scholars, all of whom have elect-

ed courses of study related to the broad areas

of interest of the Union, are Rulus Catchings,

a geophysics graduate student at Stanford

University; Charles R. Elerson, a graduate

geophysics student at Louisiana Technical University; Ronald L. Keas and Orlanda M.

at the Colorado School of Mines; Andrew

Lewis Mickle, a hydrology graduate student

Sheets, a graduate geochemistry student at

Diaz, an undergraduate oceanography stu-

dent at Washington State University; Adam

Green, a marine sciences undergraduate stu-

dent at Southhampton College of Long Is-

chemistry graduate student at the Colorado School of Mines; Michael W. Howell, a ma-

tine geochemisty students at the University

of Michigan; and Dawn J. Wright, an occan-

Catchings, Howell, and Wright have been

ography graduate student at Texas A&M

AGU Scholars in prior years.

land University; Peter A. Herrera, a geo-

The AGU Sea Scholars are Aaron Anthony

Ohio State University.

at the University of Florida; Jaime Rangel, an undergraduate geophysics student at the University of Texas at Austin; and Ronald Wynn

Marques, undergraduate geophysics students

were designed "AGU Sea Scholars."

Germany, was specifically organized to discuss the status of historical seismic data for Latin America and Europe. Since it is unlike-

Maryland has research assistantships available for graduate students. Fall Seniester 1984. The Department offers contacts of study leading to the degrees of Master of Science and Doctor of Philosophy in meteorology. Students with a bachebor's degree in meteorology, the physical sciences, mathematics, or engineering are invited to appply.

Situated in the Maryland suburits of Washington, D.C., the University is in an ideal boration for interaction with the large meteorological community of the area. The Department has conperative research agreements with the National Oceanic and Amosysheris, Administration and the National Aeronautics and Space Administration. Access to facilities of

In the first session, H. Meyers described the purpose of the workshop and gave some

history of the previous activities of the IASPÉI/Unesco Working Group on Historical Seismograms, E. R. Engdahl noted that thus ly that an additional workshop will be held on — far more than 500,000 seismograms have

this subject, reports for other regions were been filmed as part of the Historical Microincluded as well. filming Project and emphasized the importance of the activities to be covered during the workshop. M. Hashizume, representing

Unesco, described the importance of historical seismic data and the Unesco interests in having these data available for the analysis of seismic risks, particularly in areas where the recurrence rate of significant earthquakes is very low and for regions where much data do

man, Department of Meteorology, University of Maryland, College Park, MD 20742.

Research Fellowships at the University of Notre Dame. Fellowships in groundwater physics, groundwater chemistry, anaerobic processes and bioengineering are currently available in the Environmental Engineering Program of the Civil Engineering Department. Successful applicants will be awarded annual stipends of up to \$1000/mo, plur full tuition. For additional information, contact Dr. Aaron A. Jennings, Department of Civil Engineering, University of Notre Dame, Notre Dame, IN 40556 (219-239-5846).

AGU (cont. on p. 102)

# **Spring Forward**-

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these and other government agencies, including the large computers at the National Center for Atmospheric Research and NASA, are important revouces for students at Maryland. The Cooperative Institute for Clinical Research and the Center for Ocean-Land-Atmosphere Interactions, both established recently on compus, offer the student expanded opportunities for advanded study and research in climate analysis, modeling and prediction. A large number of private and government agencies within the metropolitan Washington, D.C. area offer employment opportunities.

employment opportunities.
Interested individuals are encourage to write for more information to the following address: Chair-

They will then be eligible for the Member Registration Fee at the Spring Meeting.

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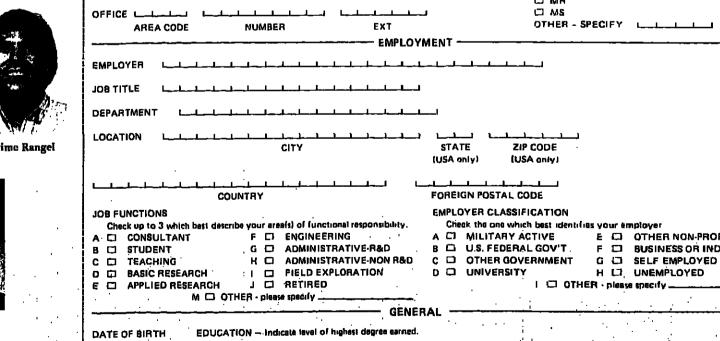
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Historical Seismograms



International Association of Seismology and Physics of

The third Workshop on Historical Seismo-grams, held in Hamburg on August 18–19, 1983, in conjunction with the meeting of the rnational Union of Geodesy and Geophysics in Hamburg, Federal Republic of



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AGU (cont. from p. 101)

not exist. He mentioned that both these conditions occur frequently in developing na-

The second, third, and fourth sessions provided an opportunity for the participants to describe the status of historical seismograms in their country. Generally, all countries indicated that there is activity relating to the preservation of historical seismograms and that the level of activity varies from country to country. The importance in preserving original seismograms, whether filmed or not, was stressed. The first task, which appears to have been completed by most countries, is the identification of the older seismic stations and the instrumentation. In some countries, work has not yet been completed in identifying whether the records still exist or where the are located. For many countries, particularly in Europe, the records have generally been located and in some cases are now extremely well organized. In some cases, filming has been done, or at least tests in various filming procedures have been started. Almost all of the reports indicated two serious conditions that prevail: (1) Many of the oldest records. particularly those which are smoked paper, are deteriorating and are in fragile condition. (2) Many records for significant events are missing from tiles of historical seismograms. In past years, these records were loaned to seismologists in other countries and probably never returned. An appeal was made for the return of seismograms to the station of ori-

During the fifth session, the speakers reflected on some of the experiences gained thus far in the Historical Seismogram Microfilming Project. The status of a related project, including a microfilm collection of Historical Station Bulletins, was described.

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The last session was devoted to recommendations. The workshop participants made 10 recommendations which were eventually written into four substantial resolutions, incorporating all of the aspects of the recommendations. The critical aspects of these four resolutions were reconstituted into one major resolution which was submitted to IASPEI and eventually passed as an official IASPEI

#### Resolutions

1. The Working Group notes and approves the progress in copying and preserving historical seis-mograms and other seismological documents of con-tinuing importance to research, reaffirms the reso-Intions of its meeting in Tokyo in 1982, December 20-22, and urges IASPEI and Unesco to continue their valued support, and to consider the following additional resolutions:

Realizing that continued delay in collecting and copying historical records will result in further deterioration and loss of irreplaceable data. The Working Group recommends (1) that World Data Centers and Regional Commissions compile lists of earthquakes believed to have been large, destructive, or to have occurred in some unusu or to possess some other special rarity; (2) that Centro Regional de Sismologia par America del sur and Pan American Institute of Geography and History ascertain what records from stations in South and Central America still exist, where they are stored, and what their physical condition is and recommend at least two stations in the region for immediare filming of all records; (3) that the USSR be asked to extend its existing program of copying to include copying of all records from at least one selected station; (4) that the European Seismological Commission select at least two stations in western and central Europe whose records should be completely copied and report their selection to their General Assembly in 1984; and (5) that developing countries with long-established stations such as those at Helwan (Egypt) and Tacubaya (Mexico) be given special encouragement and assistance to copy their

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Realizing that for some studies even the best copies are inferior to originals, and that documents and archival material other than instrumental records contain data of importance for seismological research, urges (1) that IASPEI and Unesco broaden the scope of the Working Group to consider other historical material, such as catalogs, station bulle-tins, notebooks containing unpublished materials, instrumental constants, time corrections and the like, and documents describing preinstrumental carthquakes and to assess the desirability and methods available for preserving them; (2) that World Data Centers A and B should publish a comprehensive list of seismograms that may still be consulted and should complete the microfilming of its global collection of station bulletins; (3) that all observatories retain their original records and store them in the manner best calculated to preserve them and extend their useful life; and (4) that participating nations make their hulding of historical material

vailable to World Data Centers for copying. 4. Concerned at the number of records of important earthquakes missing from surviving files of historical seismograms, urger that observatories and individual seismologists holding records borrowed from other stations, or copies of missing originals. endeavor to return them to the most appropriate organization in their country of origin without de-

Recognizing the importance of historical seismograms to the study of seismicity, earthquake risk, and the mechanism of earthquakes, particularly large earthquakes or smaller shocks in regions of infrequent activity and in developing countries where few records are available are concerned, commends the progress of the IASPEI/Unesco Working Group on Historical Seismograms in locating and copying historical material, and in securing the safety and preservation of endangered originals, and urges the Association jointly with Unesco to continue and extend their support of the aims of the group as set out in its detailed recommendations, giving particuar consideration to those that concern the preservation of originals, the innucliate copying of the rec-ords of particular stations and earthquakes, the documentation of the present location and completeness of the files of stations no longer in opera-tion, and the return of borrowed records to their

## **AGU Membership Applications**

Applications for membership have been received from the following individuals. The letter after the name denotes the proposed primary section affiliation.

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Michael Daly (S), Lawrence J. Dawson (V), Alex Demetracopoulos (11), Richard A. Dirks (A), John D. Ditmars (H), David L. Divins (G), Art Donovan (T), Jack E. Dowden (H). Segal Edward Drummond (V), Jacques Du-Bois (S), Jack 11. Durrie (GP), Eldred 14. Du-Sold (H).

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Hugh Gough (SM), George D. Guthrie (V). Deborah Hamel (1), Richard Hammond (H), Kazuro Hirahara (G), Michael R. Hoffmann (A), Edward D. Houde (O), B. B. Houser (V), Stephen E. Hurlbut (O), John A. Karachewski (GP), Susan Karl (V), William D. Keller (S), John J. King (S), Michael S. Knox (G), Ban-Yuan Kuo (S).

Caroline Lambert (GP), Edward R. Landa (H), David E. Langseth (H), Faiza Lansing (O), Harry Lawrence (G), Tamara S. Ledley (A), Yean Lee (A), Carl E. Lesher (H), David Leveson (V), Arvid T. Lonseth (G), Eugene R. Major (A), Richard Manser (H), James B. Mason (A), Peter H. McMurry (A), Joseph J. Michalsky (A), Michael F. Mills (S), Grigory Moltyaner (H), George W. Moore (T), Eu-

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Sucmnight (V), Jim Szecsody (II). Edward M. Taylor (V), Neil Ramsay Thomson (SM), Yvonne Y. W. Tsang (H), Timothy . Walsh (V), Juang Wang (H), Wei-Chyung Wang (A), James T. Wells (V), Debbie Wheeler (V), George M. White (S), Maria Zrupko (T).

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#### Announcements

Meetings

#### United Kingdom Geophysical Assembly

April 9-11, 1984 Eighth United Kingdom Geophysical Assembly, Newcastle upon Tyne, UK. (UKGA8, Department of Geophysics and Planetary Physics, School of Physcs, The University, Newcastle upon Tyne, NEL 7RU.)

Papers and research exhibits will cover all fields of geophysics, ranging from local and regional studies to the study of the entire earth. Among the specific topics to be discussed are exploration geophysics, earthquake and explosion seismology, paleomagnetism, geomagnetism, geochronology, geophysical instrumentation, planetary physics, and the teaching of geophysics. There will also be a keynote lecture each day of the assembly and a meeting of representatives of geophysics teaching departments on Wednes-day, April 11. In addition, a meeting of the Joint Association for Geophysics will be held on April 10.

#### Geoscience Instrumentation

April 19-20, 1984 Geoscience Instrumentation Workshop, Argonne, III. Sponsors, Argonne National Laboratory and the Universily of Chicago. (Don Rote, Argonne National Laboratory, 9700 S. Cass Ave., Argonne, IL 60439; tel. 312-972-3786. Contact before March 30.1

The workshop will focus on the nature of the instrument crisis in the geosciences, specific instrument and training needs, and possible solutions. Participants should be familiar with needs for geophysical/geochemical laboratory and held instrumentation. The workshop will last 2 full days, and will consist of plenary and working group meetings; a report will be published afterward. Limited funds are available for travel.

### Meeting Report

### Magnetospheric Plasma

The aim of the Chapman Conference on Waves in Magnetospheric Plasmas, February 7-11, 1983, in Hawaii was to bring together investigators of magnetospheric plasma waves having frequencies from VLF whistlers and emissions down through ELF and ULF to Pc5 long period pulsations. The emphasis was on the physics and techniques underlying the en-tire frequency range. Topics solicited included nonlinear election and ion cyclotron wave growth; wave-wave interactions, such as VLF-Pc1 (0.2-5 Hz), VLF-VLF, and various ULF-VLF; wave-particle interactions; free-energy sources for waves; harmonic generation; the role of heavy ions in wave generation and propagation; artificial wave generation such as Siple transmissions, electrojet modulation, and power line radiation; and wave and spectrum analysis techniques.

It is impossible to consider all topics presented, and this brief report concentrates on the common properties and interactions between ULF and VLF. A large body of papers dealt with the cyclotron instability. With the aid of realistic computer simulations, theoretical studies of the electron evelorion mechanism which is responsible for VLF emissions established that many of the simplifying assumptions necessary in the past could be relaxed and that the instability is quite dependent on the inhomogeneity of the magnetospheric plasma. There are still a number of questions to be answered to bring the theoretical, simulation, and experimental results together. The physics of the proton evolution instability giving rise to Pc1 pulsations has not been developed to the same extent as the electron case, probably because of the difficulties associated with undertaking accurate spectral measurements. Rather, the emphasis in this area was on thermal heavy ions (He1). O3) and associated evelotion absorption and

#### propagation effects in the magnetosphere of the Earth and the to plasma forus of Jupiter. There are important interactions among

election cyclotron whistler-mode, ion cyclotron, and low frequency hydromagnetic waves. It is studies such as these that provide the reasons why scientists from the two ends of the spectrum should interact. The intensity and frequency of both cyclotron modes are strongly and similarly affected by magnetuspheric compression and expansion. Quasi-periodic ELF/VLF emissions are probably caused by modulation of the whistler-mode generation source by Pc3-4 standing hydromagnetic waves. During substorm develop-ment, dawnside VLF chorus and duskside IPDP pulsations appear practically simultaneously. This illustrates the importance of wave-particle interactions. Other areas of interest involving wave-particle interactions included the theory of particles in Pc3-5 comoressional waves, upstream waves near the bow shock, vortices in the boundary layer plasma, and VLF chorus and Landau reso-

ments are now beginning to provide extreme-ly important and detailed results on magnetospheric properties. For example, early shutte election gun results report the generation of polatized and unpolarized electromagnetic noise while the electron beam experiment on GEOS 2 has been used to detect the electric helds of waves with frequencies up to 50 Hz. Other papers were concerned with power line radiation in the magnetosphere, VLF wave injection experiments and associated particle precipitation, and waves associated with modulated HF heating of the polar electrojet ionosphere at frequencies from several kflz down to the Pc5 range. Another group of papers addressed the topic of waves generated on auroral field lines. Electrostatic waves were invoked to explain processes associated with pulsating aurora and narrow-band emissions in a diffuse aurora. Consideration of parallel electric fields and field-aligned currents and the formation of ion conics was discussed using simulation techniques and analytical theory. It was suggested the upflowing hydrogen and oxygen ions may be accelerated by ion evolution wave heating.

Active wave and particle injection experi-

The program was arranged so that there would be no parallel sessions and with the conviction that all papers presented should interest all attendees. There were 104 papers presented in the morning and evening sessions by the 76 participants and contributions were equally divided between oral and poster presentations.

The session ended with a critique of the meeting. All felt the balance between posters and oral presentations (50/50) was just about right. A new approach was adopted for the presentation of poster papers. Prior to each poster session two previewers shared a 45minute oral presentation which provided about a 5-minute summary of the main points of each poster paper. The previewers were given at least 2 days for preparation so that they could discuss the papers with authors, obtain key figures, and prepare their preview. This proved most successful and was generally considered preferable to requesting adividual authors to attempt short presentations of their own work. This view was shared the authors, many of whom considered this preview-plus-poster method preferable to the conventional oral method for some papers. In contrast, only 1% of papers submitted indicated a preference for conventional poster presentation. The decision to have morning and evening sessions, leaving the afternoons free for discussion, was well re-

There was divided opinion on the timing of the next conference, if any, and the possible sites. In the meantime there will be a wave session at the COSPAR meeting at Grazin June 1984, and three half-day sessions on UEF/VEF waves in magnetospheric plasmas at the URSI General Assembly in Florence in September 1984. Twenty-four of the papers from the Hawaii meeting were published in the August 1983 issue of Geophysical Research Letters under the guest editorship of W. J. Hughes.

This meeting report was contributed by R. L. Dowden, who is with the Plasses Department, University of Otago, Duneden, New Zealand, and B. 1. Fraser, who is with the Physics Department, University of Newcastle, N.S.W., 2308, Australia.

### Separates

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#### Meteorology

1715 Chemical composition and chumical interactions on Tak Chemistry of StratoSpheric 842 FROT Volcauld ERUPTIONS

S. A. McKeen (Cooperative Institute for Research in Faultonesses) Salarese Helmanatry of Culorado, s. A. McKeen (fooperative institute for Research in fewironsental Sciences, University of Colorado, Soulder, Colorado, Udiny), R. C. Liu and C. S. Kiang The effects on the ambient chemistry from St., and M.S. injected into the stratosphere from the April &, 1982 volcant: cruption of El Chichon are studied with a Z-diseastonal transport model and n 1-dimensional phatochemical model. The latroduction of perturbing amounts of 50, 4re found to affect the OH radical concentration (and other gaseous apocles that are sensitive to OH) in a manner dependent upon the fate of the 1800, radical produced from the OH-SO, reaction. Observations of the El Chichon SO, cloud froe ToM and Mabus-T antellites are found to be consistent with recent Laboratory (indings that the MOSO, calestion sevent laboratory (Indings that the HOSD, exidation socianism regenerates (Ni in the presence of No. The worldcastion of an OH regenerating machanism from HOSD, exidation in the stratosphere has important implications for sulface formation in the poliuted troposphere. (Stratosphereic ED<sub>2</sub>, sulfur exidation, welcanity (Sected Springeric ED<sub>2</sub>, sulfur exidation, welcanity (Sected Springeric ED<sub>2</sub>).

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### Oceanography

4705 Roundary layer and machings processes the Present Schilarty A.D. in This case of the Piscows SUB AYER AT THE OCEAN PLANK.
T.M. Chriss (Department of Ocoanography, Dalbounde University, Maiffax, News Scotia Bin 431 Canada) and D.R. Caldwell

b.R. Caldwell
Experiments conducted on the Oregon continental shell
in June 1979 Indicate that the boundary layer flow at
the see floor was hydrodynamically smooth. Fine-remlation velocity profiles are upod to test the assumption that the flow behaved like a universally-anolar. tion that the flow behaved like a universally-anolar, mentrally-buoyant flow over a gnooth wall. The normalimensional thickness of the viscous sublayer is for more variable than has been observed in laboratory studies over perfectly stooth walls. The variability may conceivably be related to upstress changes of aufface foughness, or to the presence of distributed readmens elements. Laboratory results indicate that the near-led flow adjusts extremely slowly to upstress troughness changes, and suggests that flow near the sublayer in the ocusin may be influenced by roughness changes as for a stens of peters upstress. (Viscous sublayer, logarithmic layer) sublayor, logorithmic (syer) J. Geophys. Ros., C. Paper 400327

4790 Deganography (Instruments and Techniques)
THEORY AND VALIDATION OF THE MULTIPLE MINDOW SEA
SURFACE TEMPERATURE TECHNIQUE
L. M. McMillin (National Environmental Salvilite, Data,
and Information Service, National Oceanic and Atmospheric Administration, Vashington, D.C. 20233), and

and information Service, National County of the statistical model of the two channels which are truly a statistical models which are truly a statistical models which are truly a statistical models which consist of satellite measurements in the thorowestical results are compared to rasults from sexual measurements which consist of satellite measurements in the three infrared windows of the AFMRH. Oround truth for the comparisons comes from budys. The satellite measurements were exceeded for clouds and the remaining ones were used in the enalysis. Using this data set, several statistical analysis were performed. These showed that when the two channels which are truly a split window are used, the result of the statistical model agrees with the one derived from theoretical considerations. When the 3,8 µm channel is combined with one in the 10-12 µm region, the result of the statistical model does not take the split window form, Regults show that the method is capable of producing see surface temperatures with a standard deviation of 1 K or less. (See surface temperature, atmosphere corrections, satellite measurements).

J. Geophye. Rea., C, Paper 400220 J. Geophys. Res., C, Paper 400220

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